Appendix H. Wildlife

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Appendix H1.
Mainstem River
Watershed
Assessment:
Wildlife Species
List and
Restoration
Needs

Table 1: Wenatchee Mainstern Watershed Analysis - Wildlife, PETS Species List

			SPECIES	
COMMON NAME		HABITAT	PRESENT?	HABITAT
	FWS/FS	PRESENT?	SUSPECT?	TYPE
USFWS Listed Species				
GRAY WOLF	E, R6	YES	YES	Riparian, talus, shrub, meadows, for. int, ZOI
PEREGRINE FALCON	E, R6, MIS	YES	YES	Rock, cliff, meadows
GRIZZLY BEAR	T, R6	YES	YES	Rip,wet mdw,shrub,talus,cave,glacler,forest, ZOI
NORTHERN SPOTTED OWL	T, R6, MIS	YES	YES	Mature forest, Forest Interior, snags, riparian
N. SPOTTED OWL CRITICAL HABITAT	D	YES	YES	Nesting,Roosting,Foraging,Dispersal,For Interior
BALD EAGLE	T, R6, MIS	YES	YES	Riparian, open water, forest interior, snag, carlon
MARBLED MURRELET	T, R6	NO	NO	55 miles from marine foraging, old growth
M. MURRELET CRITICAL HABITAT	None WNF	NO	NO	Designated near nesting zones
LYNX	C, R6	YES	UNK	Young Forest, SAF, For Int, cliff, hardwd, shrub, ZOI
STEELHEAD, UPPER COLUM. BASIN	E	YES	"YES	Rivers
BULL TROUT	PT, R6	YES	YES	Fast moving, clean waters
USFWS Species Of Concern				
WESTERN BIG-EARED BAT	SC,R6	YES	UNK	Caves, talus, meadows, shrubs, forest
FRINGED MYOTIS	SC,PB	YES	UNK	Crevice,cave,bridge/bidng,drier forest,snag,wetInd
LONG-EARED MYOTIS	SC,PB	YES	UNK	Crevice,cave,bridge/bldng,forest,rip,wetInd,snag
LONG-LEGGED MYOTIS	SC,PB	YES	UNK	Cave,crevice,Ppine,rip,large snag,forest,wetl
SMALL-FOOTED MYOTIS	sc	YES	UNK	Crevice,cave,snag,forest,shrub,rip,brush
WOLVERINE	SC,R6	YES	YES	Talus, shrub, For Int, subalp mdw,rip, wetlands
NORTHERN GOSHAWK	sc	YES	YES	Forest Interior, Riparian, Openings
FISHER	sc	YES	UNK	For Int,Riparian,Wetlands,Hardwood,Den,ZOI
BIGHORN SHEEP	SC,R6	YES	YES	Grass, Cliff, Shr/brush, dry forest, ZOI
OLIVE-SIDED FLYCATCHER	sc	YES	YES	Snags, For Int, riparian, shrubs
FERRUGINOUS HAWK	SC,R6	YES	UNK	Open meadows,small trees, arid
COLUMBIA PEBBLESNAIL	sc	YES	UNK	Large open waters, rivers, cobble substrate
TAILED FROG	sc	YES	YES	Riparian, For Int, fast water, large trees
CASCADES FROG	sc	YES	YES	Riparian, wetlands
COLUMBIA SPOTTED FROG	sc	YES	YES	Riparian, wetlands
LARCH MOUNTAIN SALAMANDER	SC,R6,SM	YES	UNK	Talus, dense OG Forest,down log,moist rocky
NORTHWESTERN POND TURTLE	R6	YES	UNK	Ponds
CALIFORNIA FLOATER MUSSEL	sc	YES	YES	Large open waters, rivers/lakes, host fish

Table 1: Wenatchee Mainstem Watershed Analysis - Wildlife, PETS Species List

USFS R6 Sensitive Species				
COMMON LOON	R6	YES	YES	Lakes, downed logs, reeds
HARLEQUIN DUCK	R6	YES	YES	Fast rivers, pools/riffles
AMERICAN WHITE PELICAN	R6	YES	YES	Large lakes, wetlands
GREATER SANDHILL CRANE	R6	YES	YES	Large wetlands
RED-LEGGED FROG	R6	YES	UNK	Riparian, old growth western hemlock forest
PAINTED TURTLE	R6	YES	UNK	Ponds
CALIFORNIA KING SNAKE	R6	YES	UNK	
			SPECIES	
	14, -212-241100	HABITAT	PRESENT?	HABITAT
COMMON NAME	FWS/FS	PRESENT?	SUSPECT?	TYPE
Management Indicator Species				
MULE DEER	MIS	YES	"YES	Meadow,shrub,riparian,forest interior, security hab
ELK	MIS	YES	YES	Mdw,shrub,riparian,hardwood,for int,security hab
MOUNTAIN GOAT	MIS	YES	YES	Rock/cliff,mdw,shrub,SAF,talus,snow fleld,ZOI,For
BEAVER	MIS	YES	YES	Rivers, lakes, ponds, riparian,pools,hardwood
RUFFED GROUSE	MIS.	YES	YES	Riparian, hardwood, shrub
BALD EAGLE	MIS, T, R6	YES	YES	Riparian, open water, forest interior, snag, carion
PEREGRINE FALCON	MIS, E, R6	YES	YES	Rock, cliff, meadows
PRIMARY CAVITY EXCAVATORS	MIS	YES	YES	Snags, mature forests
NORTHERN SPOTTED OWL	MIS,T,R6	YES	YES	Mature forest, Forest Interior, snags, riparian
PILEATED WOODPECKER	MIS	YES	YES	Mature forest, Forest Interior, snags, riparian
MARTEN	MIS	YES	YES	Mature forest, Forest Interior, snags, logs, riparian
THREE-TOED WOODPECKER	MIS	YES	YES	Mature forests, insects, snags, logs
SPRING CHINOOK SALMON	MIS	YES	YES	
SUMMER CHINOOK SALMON	MIS	YES	YES	
SOCKEYE SALMON	MIS	YES	YES	
SUMMER STEELHEAD	MIS	YES	YES	
CUTTHROAT TROUT	MIS,SC	YES	YES	

Table 1: Wenatchee Mainstern Watershed Analysis - Wildlife, PETS Species List

Survey&Manage/Protect & Buffer				
LYNX .	SM,SC,R6	YES	YES	Young Forest, SAF, For Int, cliff, hardwd, shrub, ZOI
GREAT GRAY OWL	SM	YES	YES	Meadows, SAF, For Int, Snags, OG, Riparian
LARCH MOUNTAIN SALAMANDER	SM,SC,R6	YES	UNK	Talus, dense OG Forest,down log,moist rocky
VAN DYKE'S SALAMANDER	SM	YES	UNK	Cool moist forest,rocky,riparian,down log,headwtr
WARTY JUMPING-SLUG	SM	YES	UNK	Riparian, OG, For Int, duff, logs, big-leaf maple
BLUE-GRAY TAIL-DROPPER	SM	YES	UNK	Moist forests, logs, duff, big-leaf maple
PAPILLOSE TAIL-DROPPER	SM	YES	UNK	Rock slides, riparian, lodgs, forests, duff
CHELAN MOUNTAIN SNAIL	SM	YES	UNK	Talus, forests,duff,logs
WASHINGTON DUSKY SNAIL	SM	YES	YES	"Kettle" lakes, mud sediments, deciduous leaves
CALIFORNIA FLOATER MUSSEL	SM	YES	YES	Large open waters, rivers/lakes, host fish
FLAMMULATED OWL	PB	YES	YES	Dry forest, large pines, moths
WHITE-HEADED WOODPECKER	PB	YES	YES	Dry forest, large pines, insects in bark, dead trees
BLACK-BACKED WOODPECKER	PB	YES	YES	Burns, SAF, Dry forest, dead trees, LPine,insects
PYGMY NUTHATCH	PB	YES	YES	Dry forest, large pines
SILVER-HAIRED BAT	PB	YES	YES	OG forests, riparian, small wetlands, crevices
FRINGED MYOTIS	SC,PB	YES	UNK	Crevice, cave, bridge/bldng, drier forest, snag, wetlnd
LONG-EARED MYOTIS	SC,PB	YES	UNK	Crevice,cave,bridge/bidng,forest,rip,wetInd,snag
LONG-LEGGED MYOTIS	SC,PB	YES	UNK	Cave,crevice,Ppine,rip,large snag,forest,wetl
PALLID BAT	PB	NO	NO	Dry ppine, older trees, snags, broken tops

Table 1: Wenatchee Mainstern Watershed Analysis - Wildlife, PETS Species List

RUBBER BOA	3-4 Md/Lo	YES	YES	TALUS,/SCREE/MEADOWS/LOGS
SHARPTAIL SNAKE		YES	YES	HARDWOOD/RIPARIAN/EDGE/LOGS
WOOD DUCK	4 Low	YES	YES	WETLANDS/SNAGS/LOGS
COMMON GOLDENEYE	4 Low	YES	YES	WETLANDS/SNAGS
BARROW'S GOLDENEYE	4 Low	YES	YES	WETLANDS/SNAGS
HOODED MERGANSER	4 Low	YES	YES	WETLANDS/MEADOWS/SNAGS/LOGS
COMMON MERGANSER	4 Low	YES	YES	RIPARIAN/WETLANDS/SNAGS/LOGS
RED-BREASTED MERGANSER	4 Low	YES	UNK	
SHARP-TAILED GROUSE		YES	UNK	RIPARIAN/MEADOWS
MOUNTAIN QUAIL		YES	YES	RIPARIAN/WETLAND/EDGE/LOGS
WILLET		UNK	UNK	WETLAND/FIELD/MARSH/LAKE SHORE
UPLAND SANDPIPER		NO	NO	WETLANDS/UPLAND FIELDS
LONG-BILLED CURLEW		YES	YES	RIPARIAN/WETLAND/MEADOW
YELLOW-BILLED CUCKOO		NO	NO	
LONG-EARED OWL	4 Low	YES	UNK	RIPARIAN/CLIFF/CAVE/MEADOW
BOREAL OWL	5 VERY LO	YES	UNK	
VAUX'S SWIFT	4 Low	YES	YES	RIPARIAN/CLIFF/CAVE/MEADOWS
LEWIS' WOODPECKER	4 Low	YES	YES	RIPARIAN/SNAGS
RED-EYED VIREO	4 Low	YES	UNK	HARDWOODS/RIPARIAN/EDGE
WILSON'S WARBLER	4 Low	YES	YES	HARDWOOD/RIAPRAIIN/EDGE/LOGS
YELLOW-BREASTED CHAT	4 Low	YES	YES	RIPARIAN/MEADOWS
GRASSHOPPER SPARROW		YES	UNK	TALUS/SCREE/CLIFF/MEADOW
BOBOLINK		YES	UNK	RIPARIAN/MEADOW/EDGE
ROSY FINCH		YES	YES	TALUS/CLIFF/MEADOW

MAINSTEM WENATCHEE WATERSHED ASSESSMENT WILDLIFE SPECIES LIST AND RESTORATION NEEDS

	VILDEN C OI COI	LO LIGITA	TE TIESTOTO			
			SPECIES	HABITAT	RESTORATION	
	STATUS	HABITAT	PRESENT/	CONDITION?	OR MONITORING	
COMMON NAME	FWS/USFS/WA	PRESENT?	SUSPECT?		NEEDED?	
USFWS LISTED SPECIES						
GRAY WOLF	E, R6, SE	YES	SUSP	Poor, ZOI	Improve Security Hab, Monitor	
PEREGRINE FALCON	E, R6, MIS, SE	YES	SUSP	Good	Monitor Turnwater/Lk Wen	
GRIZZLY BEAR	T, R6, SE	YES	SUSP	Poor, ZOI, Spr	Improve Security Hab, Monitor	
NORTHERN SPOTTED OWL		YES	YES	Poor frag/fire	Reduce fire, improve forest interior	
N. SPOT OWL CRITICAL HABITAT		YES	NA	Fragmented	Reduce fire, improve forest interior	
					Z Nest Mngt Plans, Motorized	
	T DC MIC OT	VEC	VEC	B 4/D 1.T	Closures, ID further nests, roosts,	
BALD EAGLE		YES	YES	Boat/PerchTr	perch; Monitor	
MARBLED MURRELET	T, R6, ST	NO	NO.			
M. MURRELET CRITICAL HABITAT		NA	NA	The second secon		
LYNX	C, R6, ST	YES	UNK	Fair/Roads	Monitor Nason/Icicle Ridge	
USFWS SPECIES OF CONCERN						
PACIFIC WEST BIG-EARED BAT	SC, R6, SCA	YES	UNK	Good	Monitor caves	
FRINGED MYOTIS	SC, PB	YES	UNK	Good	Monitor cave/brdg/bldg/snags	
LONG-EARED MYOTIS	SC, PB	YES	UNK	Good	Mon crev/brdg/bldg/rip/snag	
LONG-LEGGED MYOTIS	SC, PB	YES	UNK	Good	Mon cave/brdg/bldg/rip/snag/PP	
SMALL-FOOTED MYOTIS	SC	YES	UNK	Good	Mon crevice/snag/shrub/rip/for	
CALIFORNIA WOLVERINE	SC, R6	YES	SUSP	Fair/Road/Trails	Reduce rds/trs talus/riparian	
NORTHERN GOSHAWK	SC, SCA	YES	YES	Good	Monitor Forest Interior/Snag/Log	The same and the s
FISHER	SC, SCA	YES	UNK	Fair/Road/Trails	Monitor ripar/ZOI/Wetlands/For Int	
CALIFORNIA BIGHORN SHEEP	SC, R6	NO	NO	-3		
OLIVE-SIDED FLYCATHCHER	SC	YES	SUSP	Fair Snags/Rip	Monitor snags/riparian areas	
FERRUGINOUS HAWK	SC, R6, ST	YES	UNK	Fair	Monitor open fields	
LARCH MNT SALAMANDER	SC, R6, SM, SS	The same of the sa	UNK	Good	Monitor talus/old growth Lk Wen	
TAILED FROG	SC	YES	SUSP	Fair fast streams	Monitor Chiwaukum, Restore logs.	
CASCADES FROG	SC	YES	YES	Fair	Decrease road/trail wetlands	
	SC, SCA	YES	YES	-		
COLUMBIA SPOTTED FROG		YES	UNK	Fair	Decrease road/trail wetlands	
NW POND TURTLE	SC, R6, SE	YES	UNK	Fair	Monitor & Improve ponds/road/logs	
COLUMBIA PEBBLESNAIL	SC			Fair river/lakes	Monitor Lk Wen/Wen River cobble	
CALIFORNIA FLOATER MUSSEL	SC, SCA	YES	SUSP	Fair - siltation	Monitor silt into Lk Wen/Wen River	
USFS R6 SENSITIVE SPECIES	D0 004	VEC	VEC			
COMMON LOON	R6, SCA	YES	YES	Good Lk W/Fish	Reduce motor/impr nest hab/Monito	or
HARLEQUIN DUCK	R6 55A	YES	SUSP	Good Wen/Chiw		
AMERICAN WHITE PELICAN	R6, SE	YES	YES	Good Lk W/Fish	Production of Control of Indiana Indiana Control of Indiana In	
GREATER SANDHILL CRANE	R6, SE	YES	YES	Good Lk W/Fish	Monitor migratory periods	
RED-LEGGED FROG	R6	NO	NO			
PAINTED TURTLE	R6	YES	YES	Fair	Monitor & Improve ponds/road/logs	
SPECIES STATUS						
E = Federal Endangered Species, 4/30/97 L	ISFWS Letter to WNF					
T = Federal Threatened Species, 4/30/97 U	SFWS Letter to WNF					
D = Federal Designated Critical Habitat, 4/3	0/97 USFWS Letter to	WNF				
P = Federal Progresed Species, 4/30/97 USI	FWS Letter to WNF					
C = Federal Candidate Species, 4/30/97 US						
SC = Federal Species of Concern, 4/30/97	JSFWS Letter to WNF					
R6 = Region 6, USFS, Sensitive Species, 8						
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MAINSTEM WENATCHEE WATERSHED ASSESSMENT WILDLIFE SPECIES LIST AND RESTORATION NEEDS

			SPECIES	HABITAT	RESTORATION	
	STATUS	HABITAT	PRESENT/	CONDITION?	OR MONITORING	1.00
COMMON NAME	FWS/USFS/WA	PRESENT?	SUSPECT?		NEEDED?	
ANAGEMENT INDICATOR SPECIE	S					
MULE DEER	MIS	YES	YES	Low For/Cov	Winter, reduce roads migration	
ELK	MIS	YES	YES	Low For/Cov	Winter, reduce roads migration	
MOUNTAIN GOAT	MIS	YES	YES	Low Forage	Improve winter/summer forage	
BEAVER	MIS	YES	YES	Fair	Monitor & Imprv ponds/road/logs	
RUFFED GROUSE	MIS	YES	YES	Good	Aspen/Hardwood improve	
BALD EAGLE	MIS, T, R6, ST	YES	YES	Boat/PerchTr	Reduce access/noise, protect perch	tr
PEREGRINE FALCON		YES	SUSP	Good	Monitor Turnwater/Lk Wen	
PRIMARY CAVITY EXCAVATORS	MIS	YES	YES-	Fair	Monitor fires, Natapoc, Hwy 2 Clean	cuts
NORTHERN SPOTTED OWL		YES	YES	Poor frag/fire	Reduce fire, improve forest interior	
PILEATED WOODPECKER	MIS, SCA	YES	YES	Fair	Monitor snags/LS Hab in WA	
MARTEN	MIS	YES	YES	Fair	Monitor snags/LS Hab in WA	
THREE-TOED WOODPECKER	MIS	YES	YES	Good	Monitor burns	
SPRING CHINOOK SALMON	MIS, SSC					
SUMMER CHINOOK SALMON	MIS, SSC					
SOCKEYE SALMON	MIS, SSC					
SUMMER STEELHEAD	MIS, SSC					
CUTTHROAT TROUT	MIS, SC					
SURVEY&MANAGE/PROT&BUFFE						
LYNX	SM, SC, R6, ST	YES	UNK	Fair/Roads	Monitor Nason/Icicle Ridge	
GREAT GRAY OWL	SM (LSR)	YES	SUSP	Fair	Monitor Natapoc/Chiwauk/Icicle	
LARCH MTN SALAMANDER	SM (MLSA), SC	Andrew Control of the	UNK	Good	Monitor talus/old growth Lk 'W	
VAN DYKE'S SALAMANDER	SM, SCA	YES	UNK	Good	Monitor talus/old growth Lk vV	_
WARTY JUMPING-SLUG	SM	YES	UNK	Fair	Monitor Lik Wen, Chiwaukum	
BLUE-GRAY TAIL-DROPPER	SM	YES	UNK	Fair	Monitor Lk Wen, Chiwaukum	
PAPILLOSE TAIL-DROPPER	SM	YES	UNK	Fair	Monitor rocky/forests	
CHELAN MOUNTAIN SNAIL	SM	YES	UNK	Fair	Monitor talus/logs/duff	
WASHINGTON DUSKY SNAIL	SM	YES	YES	Good	Monitor Fish Lk, Lk Wen wetInd	
CALIFORNIA FLOATER MUSSLE	SM, SC, SCA	YES	SUSP	Fair - siltation	Mon silt into Lk Wen/Wen River	
FLAMMULATED OWL	PB, SCA	YES	YES	Good	Monitor & Imprv OG Ppine Hab	
WHITE-HEADED WOODPECKER	PB, SCA	YES	YES	Good	Monitor & Imprv OG Ppine Hab	
BLACK-BACKED WOODPECKER	PB, SCA	YES	YES	Good	Monitor & Imprv SAF Snag Hab	
PYGMY NUTHATCH	PB .	YES	YES	Good	Monitor & Imprv OG Ppine Hab	
SILVER-HAIRED BAT	PB	YES	YES	Good	Monitor OG, rip, wetInd,snag	-
FRINGED MYOTIS	PB, SC	YES	UNK	Good.	Monitor cave/brdg/bldg/snags	
LONG-EARED MYOTIS	PB, SC	YES	UNK	Good	Monitor crevice/brdg/bldg/rip/snag	
LONG-LEGGED MYOTIS	PB, SC	YES	UNK	Good	Mon cave/brdg/bldg/rip/snag/PP	-
PALLID BAT	PB PB	Yes	UNK	Good	Mon Ppine, snags, old trees	-
SPECIES STATUS		100	- Sittle	3000	mont i pine, snags, ord nees	
E, T = Federal Endangered or Threatened Spo	Cies 4/20/07 ISENA	Letter to MM	F	-		
D = Federal Designated Critical Habitat, 4/30		- Total Andrews		 		
P. C. SC = Federal Proposed, Candidate Sp		The second second	USEWS Latter	to WNF		
R6 = Region 6, USFS, Sensitive Species, 8/	TOTE VERVENUE COLU	1100111, 4150/5/	COLUMN LEGIST	74111	 	
	10 Promotion Section - University	CH IV-26		-	+	
MIS = Management Indicator Species, Wen		The state of the state of	15 A7 A9 50 CO D	90		
SM = Survey and Manage Species, 4/94 NV		A STREET, STRE	U,U0-8C,09-14,U	15	1	-
PB = Protection and Buffer Species, NWFP						
SE = State Endangered Species, Washingto			St		+	
ST = State Threatened, Washington - 1/97 \		IN DESCRIPTION OF THE PROPERTY	-			-
SS = State Sensitive Species, Washington -				1		
SCA = State Candidate Species, Washingto						

Appendix H2.
Wildlife
Species/Habitat
Occurrence for
Unique or
Limited Species
in the Icicle
Restoration
Planning Area

Wildlife Species/Habitat Occurrence for Unique or Limited Species in the Icicle Restoration Planning Area

Common Name	Species Name	Designation
gray wolf - habitat	Canis lupus	Endangered
grizzly bear - habitat	Ursus arcots	Threatened
bald eagle	Haliaeetus leucocephalus	Threatened
peregrine falcon	Falco peregrinus	SC, Monitor
Northern spotted owl - habitat	Strix occidentalis caurina	Threatened
California wolverine - transient	Gulo gulo luteus	Species of Concern
Pacific fisher - transient	Martes pennanti pacifica	Species of Concern
fringed myotis	Myotis thysanoides	Species of Concern
long-eared myotis	Myotis evotis	Species of Concern
long-legged myotis	Myotis volans	Species of Concern
small-footed myotis	Myotis ciliolabrum	Species of Concern
Yuma myotis	Myotis yumanensis	Species of Concern
silver-haired bat	Lasionycteris noctivagans	Protect & Buffer
pallid bat	Antrozous pallidus	Protect & Buffer
pale Townsend's big-eared bat	Corynorhinus townsendii pallescens	Species of Concern
Western gray squirrel	Sciurus griseus griseus	Species of Concern
flammulated owl	Otus flammeolus	Protect & Buffer
northern goshawk – habitat	Accipiter gentiles	Species of Concern
ferruginous hawk	Buteo regalis	Species of Concern
harlequin duck	Histrionicus histrionicus	Species of Concern
wood duck	Aix sponsa	ICEBMP
common goldeneye	Bucephala clangula	ICEBMP
Barrow's goldeneye	Bucephala islandica	ICEBMP
hooded merganser	Lophodytes cucullatus	ICEBMP
common merganser	Mergus merganser	ICEBMP
olive-sided flycatcher	Contopus borealis	Species of Concern
little willow flycatcher	Empidonax traillii brewsteri	Species of Concern
loggerhead shrike	Lanius ludovacianus	Species of Concern
red-eyed vireo	Vireo olivaceus	ICEBMP
Wilson's warbler	Wilsonia pusilla	ICEBMP
yellow-breasted chat	Icteria virens	ICEBMP
white-headed woodpecker	Picoides albolarvatus	Protect & Buffer
black-backed woodpecker	Picoides arcticus	Protect & Buffer
pygmy nuthatch	Sitta pygmaea	Protect & Buffer
Vaux's swift	Chaetura vauxi	ICEBMP
Cascades frog	Rana cascadae	Species of Concern
Columbia spotted frog	Rana luteiventris	Species of Concern
Western toad	Bufo boreas	Species of Concern
rubber boa	Charina bottae	ICEBMP
California floater mussel - offsite	Anodonta californiensis	Species of Concern
Columbia pebblesnail - offsite	Fluminicola columbianus	Species of Concern
Chelan mountainsnail	Oreohelix n.sp.1	Survey & Manage
Papillose tail-dropper	Prophysaon dubium	S&M proposed dropped 01/01
r apmose can uropper	i ropiegación cuarcant	Seem proposed dropped of/of

Appendix H3.
Documented
Occurrence of
Wildlife Species
in the Icicle
Restoration
Project Area

Documented Occurrence of Wildlife Species in the Icicle Restoration Project Area

Rirds

Great Blue Heron Canada Goose Wood Duck

Green-winged Teal

Mallard

Ring-necked Duck

Harlequin Duck Common Goldeneve

Bufflehead

Common Merganser

Turkey Vulture

Osprey Bald Eagle

Cooper's Hawk Red-tailed Hawk

American Kestrel

Merlin

Peregrine Falcon

Ruffed Grouse California Quail

Killdeer

Spotted Sandpiper

Ring-billed Gull Mourning Dove

Great Horned Owl

Barred Owl

Western Screech-Owl

Northern Pygmy-Owl

Black Swift Vaux's Swift

Calliope Hummingbird

Rufous Hummingbird Belted Kingfisher

Red-naped Sapsucker

Red-breasted Sapsucker

Downy Woodpecker

White-headed Woodpecker

Northern Flicker Pileated Woodpecker

Olive-sided Flycatcher Western Wood-Peewee

Pacific-slope Flycatcher

Sav's Phoebe

Tree Swallow

Violet-green Swallow

N. Rough-winged Swallow

Barn Swallow Grav Jay

Steller's Jay

Clark's Nutcracker

American Crow

Ardea herodias

Branta canadensis Aix sponsa

Anas crecca

Anas platyrhynchos Authua collaris

Histrionicus histrionicus

Bucephala clangula Bucephala albeola Meraus meraanser

Cathartes aura Pandion haliaetus

Haliaeetus leucocephalus

Accipiter cooperii Buteo jamaicensis Falco sparverius

Falco columbarius Falco Peregrinus Bonasa umbellus

Callipepla californica Charadrius vociferus

Actitis macularia Larus delawarensis Zenaida macroura

Bubo virginianus Strix varia

Otus kennicotti Glaucidium gnoma

Cypseloides niger Chaetura vauxi Stellula calliope

Selasphorus rufus Ceryle alcyon

Sphyrapicus nuchalis Sphyrapicus ruber

Picoides pubescens Picoides albolarvatus Colaptes auratus

Dryocopus pileatus Contopus borealis

Contopus sordidulus Empidonax difficilis

Sayornis saya Tachycineta bicolor Tachycineta thalassina

Stelgidopteryx serripennis

Hirundo rustica Perisoreus canadensis Cyanocitta stelleri

Nucifraga columbiana

Corvus brachyrhynchos

Common Raven

Black-capped Chickadee Mountain Chickadee

Chestnut-backed Chickadee Red-breasted Nuthatch

White-breasted Nuthatch

Pygmy Nuthatch American Dipper

Golden-crowned Kinglet Ruby-crowned Kinglet Western Bluebird

Townsend's Solitaire

Veery

Swainson's Thrush

American Robin Varied Thrush Gray Catbird

Cedar Waxwing European Starling

Warbling Vireo Red-eyed Vireo

Orange-crowned Warbler

Nashville Warbler Yellow Warbler

Yellow-rumped Warbler

MacGillivray's Warbler Common Yellowthroat

Wilson's Warbler Yellow-breasted Chat

Western Tanager Black-headed Grosbeak

Spotted Towhee Chipping Sparrow Grasshopper Sparrow

Fox Sparrow Song Sparrow

Golden-crowned Sparrow

White-crowned Sparrow Dark-eyed Junco Red-winged Blackbird

Western Meadowlark Brewer's Blackbird

Brown-headed Cowbird Northern Oriole

Pine Grosbeak Cassin's Finch House Finch

Pine Siskin

American Goldfinch Evening Grosbeak

Corvus corax Parus atricapillus

Parus gambeli Parus rufescens

Sitta canadensis

Sitta carolinensis Sitta pygmaea

Cinclus mexicanus Regulus satrapa

Regulus calendula Sialia mexicana

Muadestes townsendi Catharsus fuscescens Catharsus ustulatus

Turdus migratorius Ixoreus naevius

Dumetella carolinensis Bombycilla cedrorum

Sturnus vulgaris Vireo gilvus Vireo olivaceus

Vermivora celata Vermivora ruficapilla Dendroica petechia Dendroica coronata

Black-throated Gray Warbler Dendroica nigrescens Oporornis tolmiei

Geothlypis trichas Wilsonia pusilla Icteria virens

Piranga ludoviciana Pheucticus melanocephalus

Pipilo eruthrophthalmus Spizella passerina

Ammodramus savannarum

Passerella iliaca Melospiza melodia Zonotrichia atricapilla

Zonotrichia albicollis Junco hyemalis Agelaius phoeniceus Sturnella neglecta

Euphagus cyanocephalus

Molothrus ater Icterus galbula Pinicola enucleator Carpodacus cassinii Carpodacus mexicanus

Carduelis pinus Carduelis tristis

Coccothraustes vespertinus

Mammals

Little brown bat Yuma myotis Fringed myotis

Big brown bat Black Bear

Racoon Mink Striped Skunk

Otter Coyote Douglas Tree Squirrel

Flying Squirrel N. Pocket Gopher Deer Mouse

Muskrat Beaver Porcupine Snowshoe Hare Mule Deer Elk

Muotis lucifugus

Myotis yumanensis Myotis thysanodes

Eptesicus fuscus Ursus americanos

Procyon lotor Mustela vison Mephitis mephitis Lutra canadensis

Canis latrans Tamiasciurus douglasi Glaucomys sabrinus

Thomomys talpoides Peromyscus maniculatus

Ondatra zibethica Castor canadensis Erethizon dorsatum Lepus americanus Odocoileus hemionus Cervus canadensis

Amphibians

Western Toad Cascades frog Tree/Chorus Frog Bufo boreas Rana cascadae Hyla regilla

Reptiles

N. Alligator Lizard W. Fence Lizard Garter Snake Western Rattlesnake Gopher Snake

Elegaria coerulea Sceloporus occidentalis Thamnophis sirtalis Crotalus viridis Pituophis catenifer

References:

Bird Sighting Lists: D. Stephens (NCW Audubon), H. Murphy (USFS), M. Nelson, A. Lesak Mammal, Amphibian, Reptile Sighting List: H.Murphy (USFS)

Bat Surveys: June-July 2000, N. Hedges (BLM), P. Forbes (USFS), S. Smith, J. Millard, G. Roberts, M. Nelson & H.Murphy, J.Meriwether, K.March (WDFW)

Terrestrial Mollusk Surveys: May-June 2000, S. Smith (USFS), A. Lesak, A. Winters, G. Roberts, J. Millard Spotted Owl Surveys: May-August 2000, S. Smith (USFS), J. Millard, C. Huey, J. Meriwether, G.Roberts

Appendix H4.
"Icicle River
Restoration –
Hatchery
Project, One
Page BE"

WILDLIFE AND PETS SPECIES TABLE: PROJECT ICICLE RIVER RESTORATION - HATCHERY

COMMON NAME	STATUS FWS/USFS/WA	HABITAT PRESENT?	SP. PRES/ SUSPECT?	HABITAT MODIFY?	DESIGN CRITERIA NEEDED?
USFWS/NMFS LISTED SPECIES					
GRAY WOLF (D 3/15-7/31)	E, R6, SE	Yes	No	Timing	fawning/calving 4/1 - 7/15, 1/4 mi
GRIZZLY BEAR	T, R6, SE	Yes	No	Timing	fawning/calving 4/1 - 7/15, 1/4 mi
NORTHERN SPOTTED OWL (B 3/1-8/31)	T, R6, MIS, SE	Yes	No	Mit Meas	3/1-7/31, 1/2 - 1 mi from nest
N. SPOTTED OWL CRITICAL HABITAT	D	No			
BALD EAGLE (B 1/1-8/15, W 11/1-3/31)	T - PD, R6, MIS, ST	Yes	Yes	Mit Meas	11/1-3/31 1/4 mi, unless heli 1 mi
MARBLED MURRELET (B 4/1-9/15)	T, R6, ST	No			
CANADA LYNX	T, SM, R6, ST	No			
SPRING CHINOOK SALMON, Upper Columbia	E, DCH, MIS				
STEELHEAD, Upper Columbia River	E, DCH				
STEELHEAD, Mid Columbia River	T, DCH				
BULL TROUT, Columbia River DPS	T				
Sidalcea oregana var. calva (SIOR)	E, PCH, R6				
Spiranthes diluvialis (SPDI)	T				
USFWS SPECIES OF CONCERN					
PALE TOWNSEND'S BIG-EARED BAT (PLTO	SC, PB, R6, SCA	Yes	Unk	Timing	
FRINGED MYOTIS (MYTH)	SC, PB	Yes	Yes	Timing	6/1-7/31 1st season + bat surveys
LONG-EARED MYOTIS (MYEV)	SC, PB	Yes	Unk	Timing	
LONG-LEGGED MYOTIS (MYVO)	SC, PB	Yes	Unk	Timing	
SMALL-FOOTED MYOTIS (MYSÚ)	SC	Yes	Unk	Timing	=93
YUMA MYOTIS(MYYU)(R4/1-8/31,H11/1-3/31)		Yes	Yes	Timing	6/1-7/31, snags, + bat surveys
CALIFORNIA BIGHORN SHEEP (R 4/15-6/30)		No		.9	3-1,,,,,,,,,,
	SC, R6, SCA	No			not remote enough, pos. pass thru
PACIFIC FISHER (R 3/15-5/15)	SC, R6, SCA	Yes	No	Timing	3 1 1
WESTERN GRAY SQUIRREL	SC, R6, ST	Yes	Unk	No	
HARLEQUIN DUCK (B 2/15-8/31)	SC	Yes	Yes	Timing	5/1-7/15, 1/4 mi + harlequin survey
NORTHERN GOSHAWK (B 3/1-7/31)	SC	Yes	nearby	Timing	3/1-7/31, 1/2 mile of nest
FERRUGINOUS HAWK	SC, R6, ST	Yes	No		
Call the second	SC - MO, R6, MIS, SE	Yes	Yes	Timing	Songbird in Riparian 5/1-7/31
OLIVE-SIDED FLYCATCHER (B 3/1-8/1)	SC	Yes	Yes	Timing	5/1-7/31 1st season + bird surveys
	SC		133		0.111011010000011101000011070
LOGGERHEAD SHRIKE	SC	Yes	nearby	No	seen outside project area
WESTERN TOAD	SC	Yes			Disturb wetlands 8/1-9/30 + survey
TAILED FROG	SC	No		Too mit mous	Colored Westerland of Farrey
CASC. FROG (B/R 3/1-7/31, W/H 10/1-3/1)	SC	Yes	Yes	Yes-Mit Meas	Disturb wetlands 8/1-9/30 + survey
COLUMBIA SPOTTED FROG	SC, SCA	No		Too mile mode	District House of Colors Carroy
NORTHERN RED-LEGGED FROG	SC	No			
LARCH MOUNTAIN SALAMANDER	SC, R6, SM, SS	No			
NORTHWESTERN POND TURTLE	SC, R6, SE				
COLUMBIA PEBBLESNAIL	SC	Downstream	Col/Lo.Wen	No Silting	River cobble, Wen/Col Rv. 5/15-6/3
CALIFORNIA FLOATER MUSSEL	SC, SCA	Downstream		No Silting	River cobble, Wen/Col Rv, 5/15-6/3
WEST SLOPE CUTTHROAT TROUT	SC, R6, PE, MIS			3	
INLAND REDBAND TROUT	SC, R6				
MARGINED SCULPIN	SC				
Botrychium paradoxum (BOPA)	SC, R6	No			
	SC, R6	Yes	No		
Delphinium viridescens (DEVI)	SC, R6	Yes	No		
Hackelia venusta (HAVE)	P. R6	No			
Petrophyton cinerascens (PECI)	SC, R6	No			
Silene seelyi (SISE)	SC, R6	No			
Trifolium thompsonii (TRTH)	SC, R6	No			
USFS R6 SENSITIVE SPECIES					
COMMON LOON (B-4/15-8/15)	R6, SCA	No			
EARED GREBE	R6, SS	No			
SANDHILL CRANE (M 3/15-6/1, B 5/15-8/1)	R6, SE	Yes	No	Timing	sensitive during migratory period
UPLAND SANDPIPER	R6, SE	No	140	· · · · · · · · · · · · · · · · · · · ·	densitive during inigratory period
GRAY FLYCATCHER	R6	No			
SPRING CHINOOK SALMON, Mid Columbia	R6	110			
PYGMY WHITEFISH	R6, SS				
SHARPTAIL SNAKE	R6, SCA				
STRIPED WHIPSNAKE	R6, SCA				
CALIFORNIA MOUNTAIN KING SNAKE	R6, SCA				
Agoseris elata (AGEL)	R6, SS	No	-		
Anemone nuttaliana (ANNU)	R6, SS	No			
Antennaria parvifolia (ANPA)	R6, SS	Yes	No		
Cicuta bulbifera (CIBU)	R6, SS	Yes	No		
Iliamna longisepela (ILLO)	R6, SS	No	140	-	
Saxifragopsis fragarioides (SAFR)	R6, SS	No			
ouningupais iraganulues (OMFN)	110, 33	140			

1. Need more thorough BE for project (controversial, "may affect" "beneficial affect" "adversely affect")? _X_yes

 more information attached for habitat and mitigation, if needed? Yes
 Does this complete the Biological Evaluation for this project? __yes _x no 3. Programatic BA Needed/Done? No_

DATE_2/24/01

RANGER DISTRICT :Lake Wenatchee-Leavenworth RD

WILDLIFE AND PETS SPECIES TABLE: PROJECT ICICLE RIVER RESTORATION - HATCHERY

COMMON NAME	STATUS FWS/USFS/WA	PRESENT?	SP. PRES/ SUSPECT?	HABITAT MODIFY?	ANY DESIGN CRITERIA NEEDED?
MANAGEMENT INDICATOR SPECIES			Para Value III II		
MULE DEER (R 4/1-6/15, W 12/1-4/15)	MIS	Yes	Yes	Yes	Timing Restrict 4/1-6/15, 1st seas.
ELK (R 5/1-7/15, W 12/1-4/15)	MIS	Yes	Yes	Yes	Timing Restrict 5/1-7/15, 1st seas.
MOUNTAIN GOAT (R 4/1-6/30, W 11/1-4/30)	MIS	No			
BEAVER (R 4/1-7/1, W 10/1-4/1)	MIS	Yes	Yes	Timing	Rearing 4/1-6/1, Wintering 10/1-4/1
MARTEN (R 3/15-8/31)	MIS	Yes	UNK	No	
BALD EAGLE (B 1/1-8/15, W 11/1-3/31)	MIS, T, R6, ST	Yes	Yes	Mit Meas	11/1-3/31 1/4, unless heli 1 mi
PEREGRINE FALCON(B1/1-8/15,N3/15-7/15)	MIS, SC-MO, R6, SE	Yes	Yes	Timing	Songbird in Riparian 5/1-57/31
RUFFED GROUSE (B 4/15-8/15)	MIS	Yes	Yes	No	Provide aspen, deciduous habitat
NORTHERN SPOTTED OWL (B 3/1-8/31)	MIS, T, R6, SE	Yes	No	Mit Meas	3/1-7/31, 1/2 - 1 mi of nest
PRIMARY CAVITY EXCAVATORS	MIS	Yes	Yes	Mit Meas	Retain Green Trees/Snags/Logs
THREE-TOED WOODPECKER (B 4/15-7/15)	MIS	No			
PILEATED WOODPECKER (B 4/1-6/15)	MIS, SCA	Yes	Yes	Mit Meas	Retain Green Trees/Snags/Logs
SPRING CHINOOK SALMON	MIS, E, P, SSC				
SUMMER CHINOOK SALMON	MIS, E, SSC				
SOCKEYE SALMON	MIS, SSC				
SUMMER STEELHEAD	MIS, E/T, SSC				
WEST SLOPE CUTTHROAT TROUT	MIS, PE, R6				
SURVEY & MANAGE/PROTECT & BUFFER					
CANADA LYNX	SM, T, R6, ST	No			
PALE TOWNSEND'S BIG-EARED BAT (PLTO)		Yes	No	Timing	
SILVER-HAIRED BAT (LANO)	PB	Yes	Unk	Timing	
The state of the s	PB			Timing	
PALLID BAT (ANPA)	PB. SC	Yes	Unk	Timing	6/1-7/31 1st season + bat surveys
FRINGED MYOTIS (MYTH)		Yes	Yes		b/1-//31 1st season + bat surveys
LONG-EARED MYOTIS (MYEV)	PB, SC	Yes	Unk	Timing	
LONG-LEGGED MYOTIS (MYVO)	PB, SC	Yes	Unk	Timing	
GREAT GRAY OWL (B 3/1-7/15)	SM, PB	No	11-1-	A1-	
FLAMMULATED OWL (B 5/1-8/15)	PB, SCA	Yes	Unk	No	D
WHITE-HEADED WOODPECKER (B 4/1-7/1)	PB, SCA	Yes	Yes	Mit Meas	Retain Green Trees/Snags/Logs
BLACK-BACK WOODPECKER (B 4/15-7/15)	PB, SCA	No		10.11	
PYGMY NUTHATCH (B 4/1-6/30)	PB	Yes	Yes	Mit Meas	Retain Green Trees/Snags/Logs
LARCH MOUNTAIN SALAMANDER	SM, SC, R6, SS	No			
VAN DYKE'S SALAMANDER	SM, SCA	No			
CHELAN MOUNTAIN SNAIL (OREO n.sp.1)	SM	Yes	No	No	
WA (MASKED) DUSKY SNAIL (LYRO n.sp.2)	SM	No			
WARTY JUMPING-SLUG (HEGL)	SM	No			
BURRINGTON JUMPING-SLUG (HEBU)	SM	No			
BLUE-GRAY TAIL-DROPPER (PRCO)	SM	No			
PAPILLOSE TAIL-DROPPER (PRDU)	SM, prop. drop 01/2001	Yes	No	No	
PUGET OREGONIAN SNAIL (CRDE)	SM	No			
COLUMBIAN ORGEONIAN (CRHE)	SM	No			
PRESSLEY HESPERIAN SNAIL (VEPR)	SM	No			
FUNGI GROUP	SM				
LICHEN GROUP	SM				
BRYOPHYTE GROUP	SM				
VASCULAR PLANT GROUP	SM				
ICBEMP	VIABILITY				
LONG-EARED OWL (B 3/1-6/30)	4 Low	No			
BOREAL OWL	5 Very Low	No			
VAUX'S SWIFT (B 5/15-8/15)	4 Low	Yes	Yes	Mit Meas	Retain Green Trees/Snags/Logs
LEWIS' WOODPECKER (B 4/1-7/1)	4 Low	No		iiii iiiouo	The state of the s
WILSON'S WARBLER (B 5/1-8/1)	4 Low	Yes	Yes	Timing	5/1-7/31 1st season + bird surveys
RED-EYED VIREO (B 5/1-8/1)	4 Low	Yes	Yes	Timing	5/1-7/31 1st season + bird surveys
YELLOW-BREASTED CHAT (B 5/1-8/1)	4 Low	Yes	Yes	Timing	5/1-7/31 1st season + bird surveys
WOOD DUCK (B 4/1-8/1)	4 Low	Yes	Yes	Timing	5/1-7/15, 1/4 mi + waterfowl survey
BARROW'S GOLDENEYE	4 Low	Yes	Yes	Timing	5/1-7/15, 1/4 mi + waterlowi survey
COMMON GOLDENEYE	4 Low	Yes	Yes	Timing	
COMMON GOLDENETE COMMON MERGANSER	4 Low	Yes	Yes	Timing	5/1-7/15, 1/4 mi + waterlowl survey
	4 Low		Yes		5/1-7/15, 1/4 mi + waterlowl survey
RED-BREASTED MERGANSER	and the second s	Yes		Timing	5/1-7/15, 1/4 mi + waterlowl survey
HOODED MERGANSER	4 Low	Yes	Yes	Timing	5/1-7/15, 1/4 mi + waterfowl survey
RUBBER BOA	3-4 Med/Low	Yes	UNK		
RAPTORS, WATERFOWL, SONGBIRDS AMERICAN WHITE PELICAN (B 5/1-7/1)	SE	No			

SPECIES STATUS

E, T = Federal Endangered or Threatened Species, 6/28/2000 USFWS Letter to WNF

DCH = Federal Designated Critical Habitat, 6/28/2000 USFWS Letter to WNF, 9/6/00 USFS memo

PCH = Federal Proposed Critical Habitat, 6/28/2000 USFWS Letter to WNF

P, C, SC = Federal Proposed, Candidate Species, or Species of Concern, 6/28/2000 USFWS Letter to WNF

PD = Proposed Delisting

MO = Delisted, but monitor for 5 years

R6 = Region 6, USFS, Sensitive Species, 11/28/2000 List

MIS = Management Indicator Species, Wenatchee National Forest Plan, 1990 CH iV-26

SM = Survey and Manage Species, 4/94 NWFP pages C3-6, 10-11, 19-21, 28, 39, 45, 47-48, 59-60, D9

PB = Protection and Buffer Species, NWFP pages C40-44, 45-47, D10-11

SE = State Endangered Species, Washington - 1/97 Wildlife Diversity Species List

ST = State Threatened Species, Washington - 1/97 Wildlife Diversity Species List

SS = State Sensitive Species, Washington - 1/97 Wildlife Diversity Species List

SCA = State Candidate Species, Washington - 1/97 Wildlife Diversity Species List

SSC = State Species of Concern, Washington - 1/97 Wildlife Diversity Species List

B = Breeding

N = Nesting

R = Rearing

D = Denning

W = Wintering

H = Hibemation

Appendix H5.
Potential
Wetland
Mitigation Sites

Wetland Values

The riverine wetlands that occur within the historic river channel of Icicle Creek, provide an abundance of habitat for wildlife species. Nest structure for songbirds, breeding habitat for amphibians, foraging habitat for water-birds, perching habitat for bald eagles, foraging and homesites for beaver, muskrat and mink, foraging/fawning/calving habitat for deer and elk, and open water for waterfowl.

Wetland values are usually dependant on the physical, chemical, and biological functions, and are usually separated from functions as things that are worthy, desirable or useful to humans (Mitsch and Gosselink, 1996). The extent and location of these wetlands in the Icicle Valley are factors that increase the value. The National Wetland Inventory Map indicates the wetlands created in the historic river channel at the hatchery are relatively large and rare on a landscape, which is nearly devoid of other large riverine wetlands.

GIS mapping analysis in the Icicle and Wenatchee drainages shows very little wetlands on public lands (see Figure H-6 Wetlands Map). Of the nearly 60 wetlands in the lower drainages, only five are on federal lands. In the analysis, wetlands ranged in size from 0.5 acres to 25 acres. About 25 are riverine (backwater) wetlands, about 10 are lacustrine (lakes and ponds), and 15 are palustrine (non-riverine wetlands). The hatchery area wetlands are 9.4 acres of riverine habitat, which is currently limited in the Wenatchee River drainages. Residential development in the six decades since establishment of the hatchery in and near the floodplain of the Icicle River has resulted in wetland losses from filling, and changes in hydrology and vegetation from land clearing, grazing, addition of impervious surfaces, and revetments.

These unique wetlands along with other habitats at the LNFH have high value for educational, social, and recreational use. The wetlands in the channel are particularly useful for passive recreation such as Watchable Wildlife and for education.

Wetland Mitigations

Under Alternatives 2, 3, 6, and 7 increased flows in the historic channel will greatly reduce the sediment deposition currently known to exist there. Sediments will thus be carried downstream into the Icicle and Wenatchee drainages. Downstream depositions will likely result in natural creation of wetlands further downstream as deepwater habitat becomes shallower and wetland vegetation is established. The historic river channel may convert to pre-Hatchery river habitat (see USFWS 1938 photographs).

Should the 9.4 acres of wetlands on Hatchery lands be affected by action alternatives, mitigation would include on-site and off-site, in-kind restoration and enhancement of acreage, functions and values, and acquisitions for preservation.

On-Site Wetland Improvement Potential

- After project completion, enhance small riverine wetland sections that remain in back-water areas of the historic Icicle Creek channel;
- Develop wet sites and ponds in "old" Icicle Canal using screened culvert for continuous water flow (not possible in some alternatives);
- Develop wet sites and small ponds along the Hatchery Overflow Ditch;
- Develop a small pond in Terrace above the historic channel.

Off-Site Possible Wetlands Acquisition (or Conservation Easements)

Consider acquisition or conservation easements of off-site wetlands, to enhance or improve nesting and rearing habitat for wetland dependant species.

An analysis of the lower Icicle and lower Wenatchee drainages determined there are twelve potential wetlands that could serve as effective off-site mitigation. Some of these parcels may be considered for land acquisitions or Conservation Easements. These wetlands range in size from 0.5 acres to 67 acres. They are found from the Snow Creek area in the Icicle Valley, along the river bottoms, to the Ski Hill area in the Wenatchee River drainage. There are some riverine wetland parcels, which would retain the most similar habitat to the existing historic channel. Other potential sites include upland wetlands and pond wetlands.

Wetland Mitigation Process

The loss of wetland acreage could be as much as 9.4 acres, depending on which alternative is implemented. Impacts specific to that chosen alternative will be used as the basis for a wetlands mitigation plan which will need to include, at a minimum:

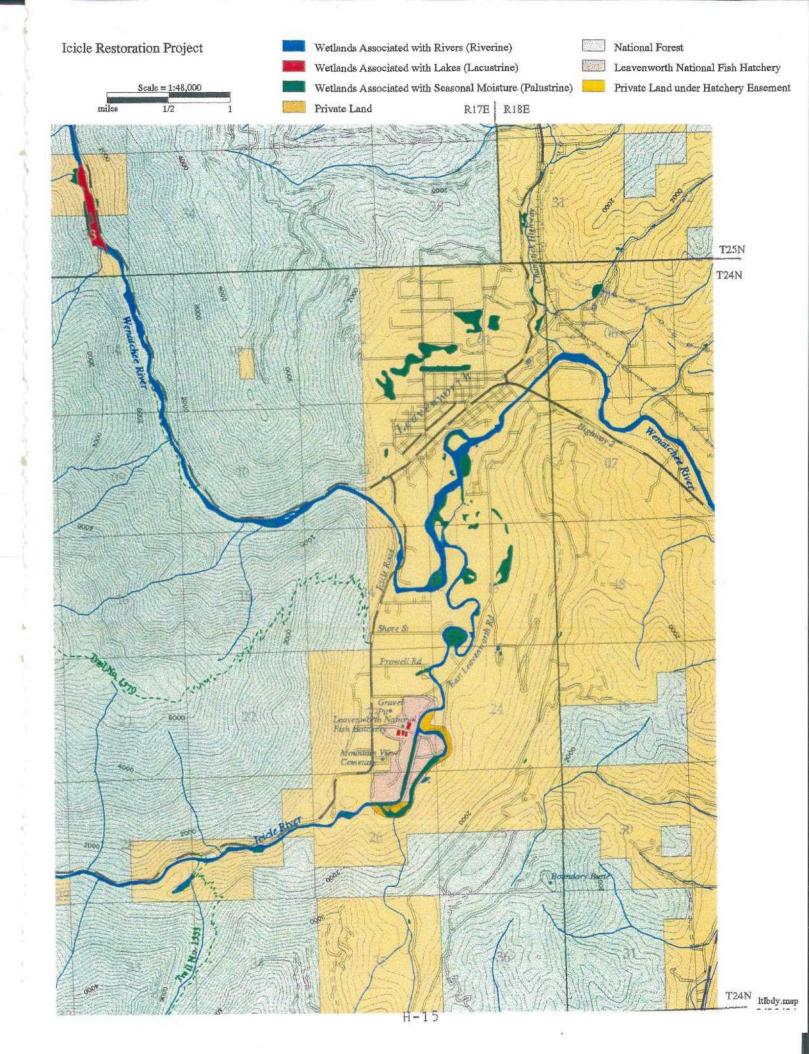
- Goals and Objectives
- Selection of methods/sites and rationale for that selection
- Ecological assessment of mitigation site
- Site plan
- Performance standards

■ Monitoring plan, including "as built" report

The mitigation plan is an important component of a permit application, and every feasible effort would be made to replace lost acreage, functions and values. Cost estimates at this time would not be realistic without the information that will be developed in the first stages of the mitigation plan. Factors influencing the cost might include:

- Will a consultant need to be hired? This will depend on the resources and availability of staff.
- Selection of methods: preservation, enhancement, restoration or a combination of these. Environmental assessments and construction costs will vary with the selection. For example, little if any construction would be associated with wetland preservation.
- Availability of property for mitigation, and type of purchase (e.g., in fee or conservation easement).
- Monitoring and contingencies:
 Monitoring requirements will likely
 be negotiated during permitting, and
 failure to meet performance
 standards may result in increased
 costs to implement contingency
 plans.
- Top end wetland mitigation costs would involve purchasing land at a 3:1 ratio. Therefore (9 acres x 3), 27 acres would need to be purchased @ \$70,000/acre for a total cost of \$1,890,000. A more moderate scenario would assume 4.5 acres could be created/enhanced for \$20,000/acre and 4.5 acres could be mitigated at a 2:1 ratio on purchase (9 acres @ \$70,000/acre) for a total \$720,000.

Appendix H6. Wetlands Map



Appendix H7.
Wildlife Timing
Restrictions

Required Wildlife Timing Restrictions for Known Breeding or Wintering Species

Species/Habitat	Timing Restriction Requirement
Bald Eagle - Winter Roost	Nov 1 to Mar 31 - No Activity, or Operations Only Between 9:00am-3:00pm
Riparian Habitat for Harlequin Duck, Olive-sided Flycatchers, Cascades Frog, Fringed Myotis, and Yuma Myotis	Prior to Actions in Riparian Habitat, Survey for Active Breeding/Rearing of these Species (March 1 to July 31)

Suggested Timing Restrictions for Other Known Breeding or Wintering Species

Species/Habitat	If Possible, Exclude Operations During
Deer/Elk - Fawning/Calving	Apr 1 to Jul 15
Bald Eagle Potential Nesting	Mar 1 to July 15
Harlequin Duck - Nesting/Rearing	Critical Period (May 1 to Jul 15) Breeding Period (Feb to Aug)
Riparian -Songbird Nesting	May 1 to Jul 31
Amphibian -Breeding & Metamorphosis	Critical Period (Mar 1 to May 31) Breeding Period (Mar 1 to Jul 31)
Amphibian - Over Wintering	Nov 1 to Mar 31
Bat Species - Rearing	Critical Period (Jun 1 to Jul 31) Breeding Period (Apr 1 to Aug 31)
Beaver - Rearing	Apr 1 to Jul 1
Beaver - Winter Stress	Oct 1 to Apr 1

Appendix I.
Preparation of
Historic Channel
for
Implementation
Activities

This Appendix details the plan to ensure fish are not stranded in the historic channel when it is dried up in alternatives which remove historic structures The channel would be snorkeled and walked prior to drying up the channel to inventory fish present in the channel. The channel flow would be reduced in a two step process. Flow would be reduced until very little flow exists. Then the channel would be walked and fish would be captured by dip netting and electrofishing and moved to the main channel. Then the flow would be entirely cut off. The channel would be monitored through this process to ensure that no fish are left stranded.

Required Wildlife Timing Restrictions for Known Breeding or Wintering Species

Species/Habitat	Timing Restriction Requirement
Bald Eagle - Winter Roost	Nov 1 to Mar 31 - No Activity, or Operations Only Between 9:00am-3:00pm
Riparian Habitat for Harlequin Duck, Olive-sided Flycatchers, Cascades Frog, Fringed Myotis, and Yuma Myotis	Prior to Actions in Riparian Habitat, Survey for Active Breeding/Rearing of these Species (March 1 to July 31)

Suggested Timing Restrictions for Other Known Breeding or Wintering Species

Species/Habitat	If Possible, Exclude Operations During
Deer/Elk - Fawning/Calving	Apr 1 to Jul 15
Bald Eagle Potential Nesting	Mar 1 to July 15
Harlequin Duck - Nesting/Rearing	Critical Period (May 1 to Jul 15) Breeding Period (Feb to Aug)
Riparian -Songbird Nesting	May 1 to Jul 31
Amphibian -Breeding & Metamorphosis	Critical Period (Mar 1 to May 31) Breeding Period (Mar 1 to Jul 31)
Amphibian - Over Wintering	Nov 1 to Mar 31
Bat Species - Rearing	Critical Period (Jun 1 to Jul 31) Breeding Period (Apr 1 to Aug 31)
Beaver - Rearing	Apr 1 to Jul 1
Reaver - Winter Stress	Oct 1 to Apr 1

Appendix J.
Statutory
Mandates and
Authorities

General Authorizations

- 1. Anadromous Fish Conservation Act, as amended (16 U.S.C.757a-757f).
- 2. Department of Transportation Act (16 U.S.C. 1653f).
- 3. Estuary Protection Act (16 U.S.C. 1221-1226).
- 4. Federal Aid in Sport Fish Restoration Act of August 9, 1950, as amended (16 U.S.C. 777k).
- Federal Water Pollution Control Act Amendments, as amended (33 U.S.C. 1251-1365, 1281-1292, 1311-1328, 1341-1345, 1361-1376).
- 6. Fish and Wildlife Act of 1956, as amended (16 U.S.C 742a-742j).
- 7. Fish and Wildlife Conservation Act of 1980 (16 U.S.C. 2901-2911).
- 8. Indian Self-Determination and Education Assistance Act of 1976 (25 U.S.C. 450-450n).
- 9. Magnuson Fishery Conservation and Management Act of 1976 (16 U.S.C. 1801-1882).
- 10. National Aquaculture Act of 1980, an amended (16 U.S.C. 2801-2810)
- 11. Reorganization Plan No. 4 of 1970 (5 U.S.C. Appendix)
- 12. Rivers and Harbors Act of 1899, as amended (33 U.S.C. 401 et seq.).
- 13. Recreation Use of Conservation Areas Act (16 U.S.C. 460k-460k-4).
- 14. Sikes Act, as amended (16 U.S.C. 670a-670o).
- 15. Watershed Protection and Flood Prevention Act, as amended (16 U.S.C. 1001-1009).
- 16. Code of Federal Regulation, Wildlife and Fisheries, Title 50, Parts 1 to 199.
- 17. Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 stat. 884) as amended.
- 18. Federal Power Act (16 U.S.C. 791-828c; Chapter 285, June 10, 1920; 41 Stat. 1063) as amended.
- 19. Federal Water Project Recreation Act [16 U.S.C. 460 (L)(12) 460 (L)(21); P.L. 89-72].
- 20. Fish and Wildlife Coordination Act (16 U.S.C. 661-667e; 48 Stat. 401) as amended.
- 21. Fish and Wildlife Improvement Act (16 U.S.C. 7421; 92 Stat. 3110)
- 22. Lacy Act Amendments of 1981 (P.L. 97-79; 95 Stat. 1073, 16 U.S.C. 3371-3378)
- 23. Nonindigenous Aquatic Nuisance Prevention and Control Act of 1990 [Title I of P.L. 101-646 (104 Stat. 4761)].
- 24. Oil Pollution Act of 1990 [Public Law 101-380 33 U.S.C. 2701 et seg; 104 Stat. 484].
- 25. Comprehensive Environmental Response Compensation and Liability Act (Superfund)(26 U.S.C. 4611-4682; P.L. 96-510, December 11, 1980; 94 Stat. 2797)
- 26. National Environmental Policy Act of 1969 (P.L. 91-190, 42 U.S.C. 4321-4347, January 1, 1970, 83 Stat. 852) as amended by P.L. 94-52.
- 27. National Wildlife Refuge System Administration Act of 1966 (16 U.S.C. 668dd-668ee) as amended.

Area-Specific Authorizations

- A. Belloni Decision [302 F. Supp. 899 (1969); affirmed, 529 F. 2d 570 (1976)].
- B. Boldt Decision [384 F. Supp. 312 (1974); affirmed, 520 F. 2d 676 (1975); cert. denied, 423 U.S. 1086 (1976)].
- C. Water Resources Development Act of 1976 [Lower Snake River Compensation Plan (90 Stat. 2921)].
- D. Pacific Salmon Treaty Act of 1985 (P.L. 99-5).
- E. Salmon and Steelhead Conservation and Enhancement Act (16 U.S.C. 3301-3325).
- F. Yakima Fishery Enhancement Project (P.L. 98-360, P.L. 98-381, P.L. 98-386).
- G. Grand Coulee Fish Maintenance Project [Columbia Basin (Grand Coulee Dam) Act] April 3, 1937.
- H. Chief Joseph Dam Project [Oroville-Tonasket Unit, Washington (76 Stat. 761) Section 3 of the Act of October 9, 1962] [Whitestone Coulee Unit, Washington (43 U.S.C. 616uu, 616vv-1-616-3; 78 Stat. 704], as amended.
- I. Columbia Basin Project Act (16 U.S.C. 835 et seq., 57 Stat. 140) as amended.
- J. Chehalis River Fishery Resource Study and Restoration Act [Public Law 101-454 (104 Stat. 1054)].
- K. Mitchell Act (16 U.S.C. 755-757; 52 Stat. 345).
- L. Pacific Northwest Electric Power Planning and Conservation (16 U.S.C. 839, P.L. 96-501, 94 Stat. 2697) as amended.

National Fish Hatchery Authorizations

- I. Abernathy Salmon Culture Technology Center Mitchell Act.
- II. Carson National Fish Hatchery Appropriation Act of May 28, 1937 (50 Stat. 220). Remodeled and expanded under Mitchell Act.
- III. Leavenworth National Fish Hatchery Complex Grand Coulee Fish Maintenance Project. Re-authorized under Mitchell Act.
- IV. Entiat National Fish Hatchery Complex Grand Coulee Fish Maintenance Project. Re-authorized under Mitchell Act.
- V. Winthrop National Fish Hatchery Complex Grand Coulee Fish Maintenance Project. Re-authorized under Mitchell Act.

Description of roles/responsibilities/authorities for species being produced beyond those initially authorized follow:

- Treaty with the Walla Walla, Cayuse, Umatilla Tribes, 06/09/1855
- Treaty with the Yakima, 06/09/1855
- Treaty with the Nez Perce, 06/11/1855
- Treaty with the Tribes of Middle Oregon, 06/25/1855
- Treaty with the Bands of Colville, 04/08/1872
- U.S. v. Oregon (Sohappy v. Smith, "Belloni decision", Case 899), 07/08/1969
- Endangered Species Act of 1973, 87 Stat. 884, 12/28/1973
- Salmon and Steelhead Conservation and Enhancement Act, 94 Stat. 3299, 12/22/1980
- Pacific Salmon Treaty Act of 1985, Public Law 99-5, 03/15/1985

Appendix K. Flow Summary

Flow Summary

Estimated Maximum Flows (cfs) for the Historic Channel Per Alternative (ENSR 2000):

Alternative 1 = minimal flow typically less than 200.

Alternative 2 = unrestricted flow

Alternative 3 = 2620

Alternative 4 = 2610

Alternative 5 = minimal flow (current conditions)

Alternative 6 = 2090

Alternative 7 = 2229

Other Estimated Flows:

Flow Split = 1360 cfs which is equivalent to a water surface elevation at the upstream end of the headgate of 1129 (ENSR, 2000).

Bankfull Flow of Historic Channel (current conditions) = 1450 cfs (ENSR and Stream Team, 2000)

Bankfull Flow of Historic Channel (pre-hatchery conditions) = 3870 cfs (Robison pers. comm.)

Appendix L. Aquifer Dymanics

Aquifer Dynamics

Aquifer dynamics were modeled with the 3-dimensional, numerical ground water flow model MODFLOW. The model was constructed with a 45x45 grid consisting of 2,25 square cells that are 100 feet on a side. Simulated wells, 1, 2, 3a, 4, 6, and 7 each occupy a separate cell. Icicle Creek, Icicle canal, the two ditches, and irrigation were represented in the model. Model inputs, including boundary conditions, recharge from

precipitation, surface water leakage and aquifer parameters were calculated or approximated from existing data or data obtained during the pumping test program in 1994. Model inputs and construct can be found in the analysis file.

Simulation of current groundwater elevations for steady-state conditions (no pumping) with average aquifer recharge is shown in Fig. 2. Groundwater/surface water features evident in the current condition simulation include the identification of the canal as a

"loosing" reach, meaning that the canal looses water to the aquifer. This feature is indicated by the by the "ridge" of high heads along the canal (in general groundwater flow follows the head gradient, from areas of high head to areas of lower head). Also evident is the "gaining" nature of the original channel, meaning that the channel receives water from the shallow aquifer. This feature is indicated by the slight "trough" of heads along the original channel.

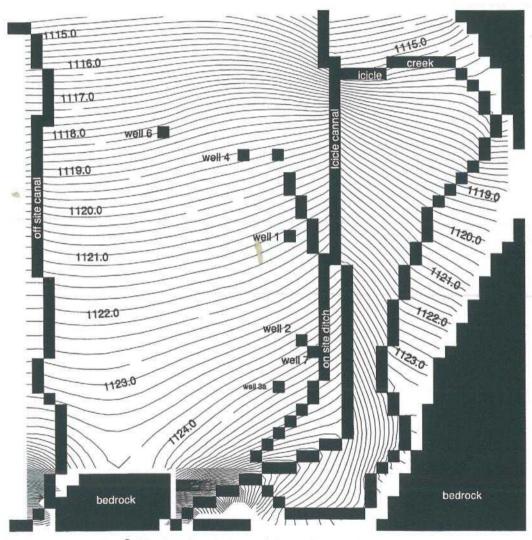


Fig. 2 Simulated static head, full canal, normal recharge

Simulation of steady-state conditions with the canal dewatered under average aquifer recharge is shown in Fig. 3. Groundwater/surface water features evident in this scenario

include the lack of recharge from the canal to the aquifer as indicated by the disappearance of the high head "ridge" along the canal. Instead, recharge to the shallow aquifer takes place along the original channel due to water diversion into the channel.

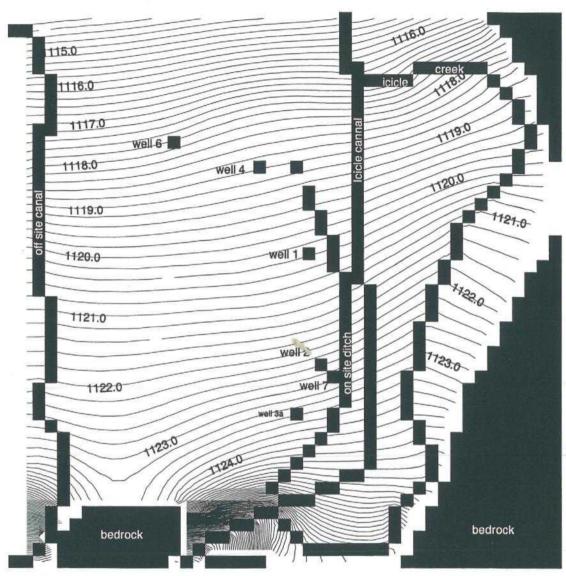


Fig. 3 Simulated static head, dry canal, normal recharge

Simulation of steady-state conditions with the canal dewatered under low recharge conditions is shown in Fig.

4. Gross features are essentially the same as those in Fig. 3, however; overall heads are approximately four

feet lower. This is due to modeled decreases in recharge, both precipitation and stream flow.

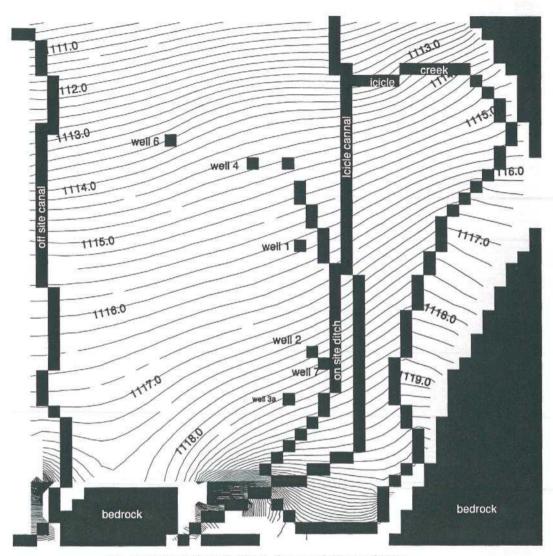


Fig. 4 Simulated static head, dry canal, low recharge

Further examination of Fig. 2, and Fig. 3 suggest that dewatering of the canal under normal recharge conditions would lead to a decrease in heads in the western portion of

the study area of approximately one foot. The decrease would result from the lack of recharge from the canal. In contrast the eastern portion of the study area would see an increase in head of about one foot. The increase is most evident in the northeast quadrant of the study area and is simply a result of diverting water to original channel.

Total available head under the preceding scenarios is displayed in Table 1. Total available head for each scenario is the steady-state head elevation minus the pump inlet elevation. Total available head represents the lowest elevation of the water table that allows usable recharge to the well.

Table 1.

		Static Water elevation			Total available head			
Well #	Pump intake elevation	Canal wet, Normal recharge conditions	Canal dry, Normal recharge conditions	Canal dry, low recharge conditions	Canal wet, Normal recharge conditions	Canal dry, Normal recharge conditions	Canal dry, low recharge conditions	
1	1076.0	1121.3	1120.4	1115.9	45.3	44.4	39.9	
2	1067.0	1123.8	1122.4	1117.7	56.8	55.4	50.7	
3a	1090.0	1123.8	1124.0	1118.5	33.8	34.0	28.5	
4	1054.0	1118.9	1118.8	1114.5	64.9	64.8	60.5	
6	1043.0	1118.2	1117.9	1113.6	75.2	74.8	70.6	
7	1069.0	1124.4	1122.7	1118.0	55.4	53.7	49.0	

While Fig. 2 through Fig. 4 show the results of various scenarios during steady-state (no pumping) conditions, they do not display the effects of various pumping scenarios on the aquifer.

The simulated pumping schedule recommended for demands over 5000 cfs (Sverdrup 1994) is shown in Table 2. This schedule pumps wells 6, 1, 3a, and 4 for two weeks, then substitutes well 2 for well 3a for another two weeks. This cycle was repeated for a total pumping time of eight weeks. Discharge for the simulated wells is summarized in the third column. Well 5, which is capable of producing up to 1700 cfs, was not included in the simulation because it is developed in the deeper, confined aquifer. During high demand periods the combination of well 5 with the outlined scenario would produce upwards of 5550 cfs.

Table 2				
Wells pumped	Time pumped	Discharge		
6,1,3a,4	2 weeks	3850 cfs		
6,1,2,4	2 weeks	4210 cfs		
6,1,3a,4	2 weeks	3850 cfs		
6,1,2,4	2 weeks	4210 cfs		

Simulation of transient conditions shows the effects of withdrawing water from the aquifer trough the Hatchery production wells. Simulating the recommended schedule for production well pumping (Sverdrup 1994) with a full canal and normal recharge rates resulted in head and drawdown values illustrated in Fig. 5 and Fig 6.

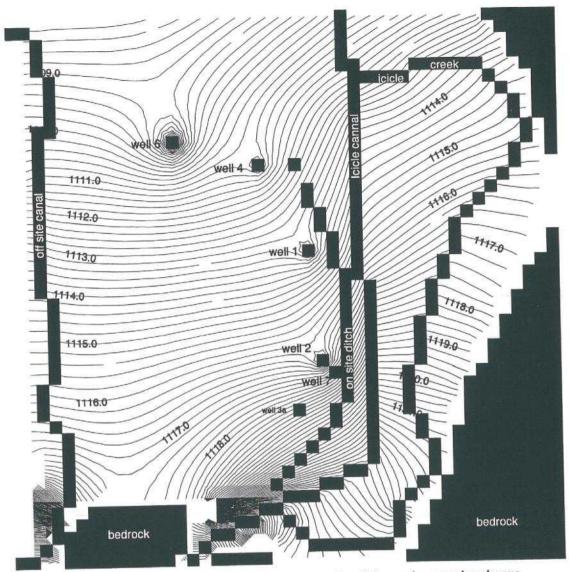


Fig. 5 Simulated head after 8 week cyclic pumping, full canal, normal recharge

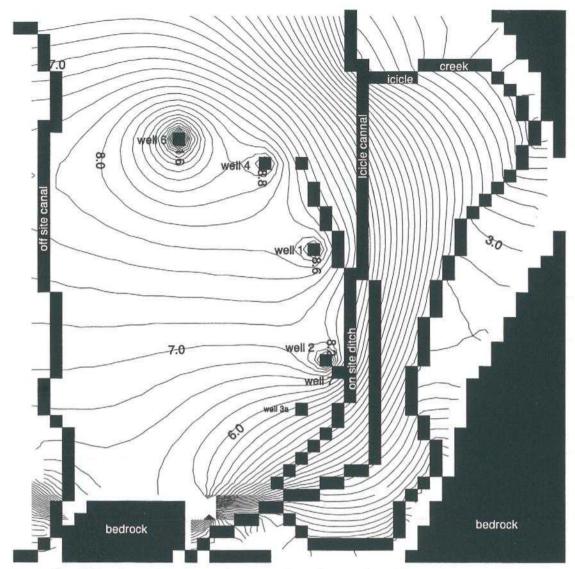


Fig. 6 Simulated drawdown after 8 week cyclic pumping, full canal, normal recharge

Simulating the recommended schedule for production well pumping combined with a dewatered canal and normal recharge resulted in head and drawdown values illustrated in Fig. 6 and Fig. 7.

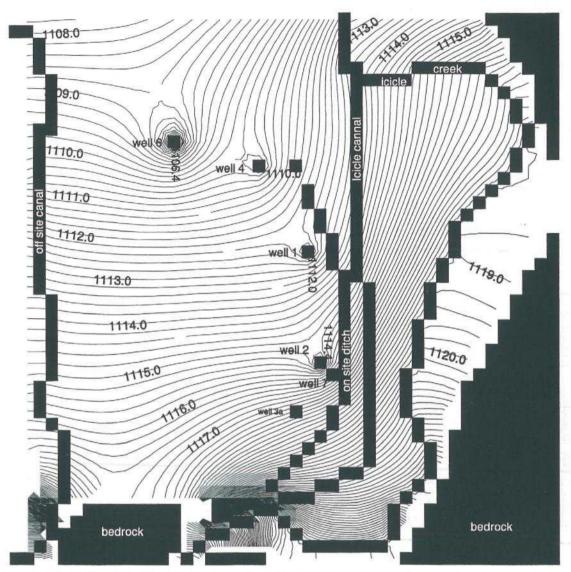


Fig. 7 Simulated head after 8 week cyclic pumping, dry canal, normal recharge

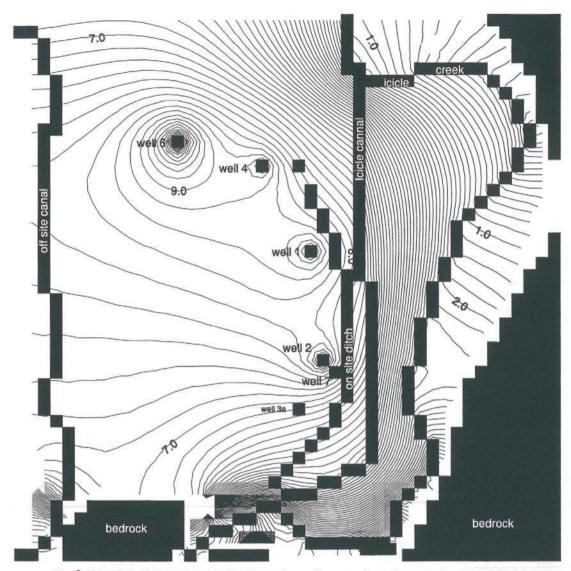


Fig. 8 Simulated drawdown after 8 week cyclic pumping, dry canal, normal recharge

Comparison of Fig. 5 and Fig. 7 indicates that using the recommended pumping schedule with a dewatered canal would result in lower heads on the western side of the canal when compared to pumping with a full canal. It is interesting to note that heads on the eastern side of the canal are slightly higher with a dewatered canal. This is a result of redirecting canal water to the original channel. Comparison of Fig. 6 and Fig. 8 illustrate these observations in terms of drawdown. The cone of depression is approximately one foot lower in elevation on the western side of the project area, while east of the canal; the cone elevation is slightly higher. These two figures also illustrate that the gradient of the water table would be much steeper in the eastern portion under the dry canal scenario, which is a result of aquifer recharge from the original channel instead of from the canal.

Simulating the recommended pumping schedule with a dewatered canal and low recharge rates is illustrated in Fig. 9 and Fig. 10.

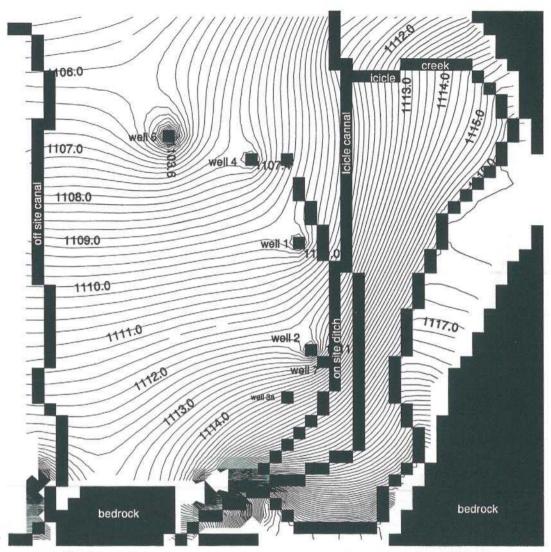


Fig. 9 Simulated head after 8 week cyclic pumping, dry canal, low recharge

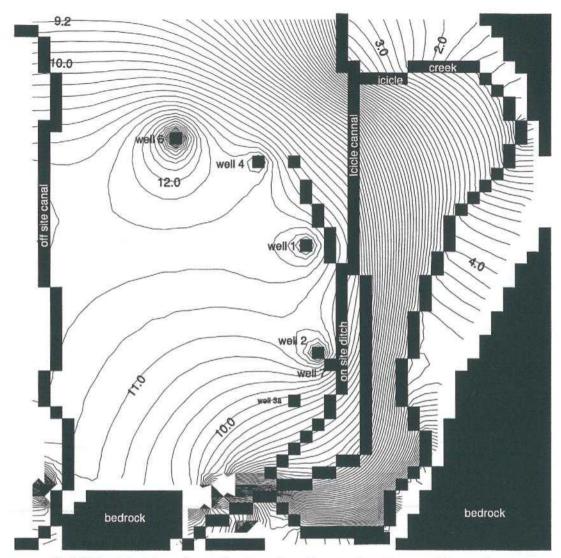


Fig1 0Simulated drawdown after 8 week cyclic pumping, dry canal, low recharge

As mentioned in Chapter 3, the model is not able to accurately predict drawdown at individual wells due to cell size, but at distances removed from the pumping wells the model results approach observed results. Analysis of the effects of aquifer drawdown on well capability then requires the use of observed drawdowns during pump test for an indication of drawdown near well sites, and model results for areas removed from well sites.

Maximum available drawdown is presented in Table 3. This represents an estimate of the maximum amount of drawdown available during pumped conditions.

Table 3

Total available drawdown (feet)			Simulated drawdown			maximum available pumped conditions				
Well #	Canal wet, Normal recharge	Canal dry, normal recharge	Canal dry, low recharge	Individual well drawdown	Canal wet, Normal recharge	Canal dry, normal recharge	Canal dry, low recharge	Canal wet, Normal recharge	Canal dry, Normal recharge	Canal dry, low recharge
1	45.3	44.4	39.9	17.0	8.7	9.7	12.6	19.6	17.6	10.3
2	56.8	55.4	50.7	37.7	8.2	9.4	12.4	10.9	8.3	0.6
За	33.8	34.0	28.5	26.5	5.7	6.8	9.8	1.6	0.7	-7.9
4	64.9	64.8	60.5	15.3	9.0	9.5	12.2	40.7	40.0	33.0
6	75.2	74.8	70.6	32.0	11.7	12.1	15.0	31.5	30.7	23.6
7	55.4	53.7	49.0	35.0	6.5	7.8	10.7	13.9	11.0	3.3

Referring to Fig. 6, Fig. 8, Fig. 10, Table 3 and bearing in mind the percentage errors listed in chapter three, provides an indication of the effect of dewatering the canal on the well field utilization (see Chapter 4, Aquifer Dynamics).

Appendix M. Construction Costs

Alternative 2 Construction Costs

Item Description	Construction Costs	Total Cost
Diversion Dam Area Improvements		
New Fish Ladder	322,717	\$400,169
Structure No. 2		550. 550
Channel Dewatering (see also Structure No. 5)	209,990	\$260,388
Removal of Diffusion Dam	84,534	\$104,822
Removal of Flume Structure	25,355	\$31,441
Removal of Seine Platform	13,523	\$16,768
Removal of Spawning Shed Foundation	8,452	\$10,480
Removal of Rack Structure	13,986	\$17,343
Construction of Vertical Slot Fishway	355,907	\$441,325
Removal of Headgate Structure	223,115	\$276,663
Lowering of Canal	422,510	\$523,912
Structure No. 3		
Removal of Diffusion Dam	84,534	\$104,822
Removal of Flume Structure	25,355	\$31,441
Removal of Seine Platform	13,523	\$16,768
Removal of Spawning Shed Foundation	8,452	\$10,480
Removal of Rack Structure	13,986	\$17,343
Structure No. 4		V
Removal of Diffusion Dam	84,534	\$104,822
Removal of Pedestrian Bridge	18,382	\$22,794
Removal of Flume Structure	25,355	\$31,441
Removal of Seine Platform	13,523	\$16,768
Removal of Spawning Shed Foundation	8,452	\$10,480
Removal of Rack Structure	13,986	\$17,343
Structure No. 5		
Channel Dewatering (see also Structure No. 2)	300,438	\$372,543
Removal of Existing Vehicular Bridge	124,210	\$154,021
Mitigation Measures		
Construct New Vehicular Bridge to Private Residence	496,832	\$616,072
Historic Structures Mitigation	71,156	\$88,234
Wetland Mitigation	1,189,100	\$1,474,484
Streambank stabilization	683,100	\$847,044
Total Project Costs (FY 2000 Dollars)		\$6,020,209

Alternative 3 Construction Costs

Item Description	Construction Costs	Total Cost
Diversion Dam Area Improvements		
New Fish Ladder	322,717	\$400,169
Structure No. 2		
Channel Dewatering (see also Str. No. 5)	209,990	\$260,388
Construction of Vertical Slot Fishway	355,907	\$441,325
Rehabilitation of Headgate Structure	268,813	\$333,328
Armor Streambed Around Remaining Diffusion Dam	14,687	\$18,211
Structure No. 3		
Removal of Diffusion Dam	84,534	\$104,822
Removal of Flume Structure	25,355	\$31,441
Removal of Seine Platform	13,523	\$16,768
Removal of Spawning Shed Foundation	8,452	\$10,480
Removal of Rack Structure	13,986	\$17,343
Structure No. 4		
Removal of Diffusion Dam	84,534	\$104,822
Removal of Pedestrian Bridge	18,382	\$22,794
Removal of Flume Structure	25,355	\$31,441
Removal of Seine Platform	13,523	\$16,768
Removal of Spawning Shed Foundation	8,452	\$10,480
Removal of Rack Structure	13,986	\$17,343
Structure No. 5	35.48.0 * 3.000/cs.	
Channel Dewatering	300,438	\$372,543
Construct New Fish Sorting Facilities (Left Bank)	96,957	\$120,226
Construct New Fish Sorting Facilities (Right Bank) Modify Existing Structure No. 5 14,217 \$17,629	96,957	\$120,226
Construct New Fish Barrier Downstream of Structure	348,666	\$432,345
Sorting Facility Water Supply	115,039	\$142,649
Armor Streambed Around Remaining Diffusion Dam	14,687	\$18,211
New Electrical Power Distribution Line to Island Mechanical Dredging of Original Channel	108,573	\$134,630
Sediment Removal	210,083	\$260,504
	119,406	\$148,064
Disposal of Sediment Mitigation Measures	119,400	\$140,004
마르크리카(프리크) : : : : : : : : : : : : : : : : : : :	71,156	\$88,234
Historic Structures Mitigation Wetland Mitigation		\$1,474,484
Streambank stabilization	426,938	\$529,403
Streambank Stabilization	420,336	\$023,403
Total Project Costs (FY 2000 Dollars)		\$5,697,069

Alternative 5 Construction Costs

Item Description	Construction Costs	Total Cost
Structure No. 2 Rehabilitation of Headgate Structure	376,338	\$466,659
Structure No. 3 No Action	0	\$0
No Action Structure No. 5	0	\$0
No Action Spillway Structure	0	\$0
New Sorting Facility and Fish Bypass Rebuild Entrance to Existing Hatchery Ladder	684,579 341,199	\$848,878 \$423,087
Total Project Costs (FY 2000 Dollars)		\$1,738,623

Alternative 6 Construction Costs

Item Description	Construction Costs	Total <u>Cost</u>
Diversion Dam Area Improvements		
New Fish Ladder	322,717	\$400,169
Structure No. 2		
Channel Dewatering (see also Structure No. 5)	209,990	\$260,388
Construction of Vertical Slot Fishway	355,907	\$441,325
Rehabilitation of Headgate Structure	268,813	\$333,328
Armor Streambed Around Remaining Diffusion Dam	14,687	\$18,211
Structure No. 3		
Armor Streambed Around Remaining Diffusion Dam	14,687	\$18,211
Structure No. 4		
Armor Streambed Around Remaining Diffusion Dam	14,687	\$18,211
Structure No. 5		
Channel Dewatering	300,438	\$372,543
Construct New Fish Sorting Facilities (Left Bank)	96,957	\$120,226
Construct New Fish Sorting Facilities (Right Bank)	96,957	\$120,226
Modify Existing Structure No. 5	194,270	\$240,895
Sorting Facility Water Supply	115,039	\$142,649
Armor Streambed Around Remaining Diffusion Dam	14,687	\$18,211
Electrical	7,906	\$9,804
Mitigation Measures		
Historic Structures Mitigation	23,719	\$29,411
Wetland Mitigation	1,189,100	\$1,474,484
Streambank stabilization	426,938	\$529,403
Total Project Costs (FY 2000 Dollars)		\$4,547,696

Alternative 7 Construction Costs

Item Description	Construction Costs	Total <u>Cost</u>
Diversion Dam Area Improvements		
New Fish Ladder	322,717	\$400,169
Structure No. 2		
Channel Dewatering (see also Structure No. 5)	209,990	\$260,388
Construction of Vertical Slot Fishway	355,907	\$441,325
Rehabilitation of Headgate Structure	268,813	\$333,328
Removal of Diffusion Dam	84,534	\$104,822
Removal of Flume Structure	25,355	\$31,441
Removal of Seine Platform	13,523	\$16,768
Removal of Spawning Shed Foundation	8,452	\$10,480
Removal of Rack Structure	13,986	\$17,343
Structure No. 3		Figure 18 of a Source Indian
Removal of Diffusion Dam	84,534	\$104,822
Removal of Flume Structure	25,355	\$31,441
Removal of Seine Platform	13,523	\$16,768
Removal of Spawning Shed Foundation	8,452	\$10,480
Removal of Rack Structure	13,986	\$17,343
Structure No. 4		
Armor Streambed Around Remaining Diffusion Dam 14,687 \$*	18,211	
Structure No. 5		
Channel Dewatering (see also Structure No. 2)	300,438	\$372,543
Removal of Existing Vehicular Bridge	124,210	\$154,021
Mechanical Dredging of Original Channel		
Sediment Removal	161,603	\$200,388
Disposal of Sediment	91,851	\$113,896
Mitigation Measures		
Historic Structures Mitigation	47,438	\$58,823
Wetland Mitigation	1,189,100	\$1,474,484
Streambank stabilization	426,938	\$529,403
Total Project Costs (FY 2000 Dollars)		\$4,718,684

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